

Hydrological Balance in Tropical Cyclones with Scatterometer and TRMM Data

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Precipitation over ocean can be estimated from the radar and the microwave radiometer of the Tropical Rain Measuring Mission (TRMM). It can also be estimated from the divergence of the vertically integrated water vapor transport, through the conservation principle, assuming evaporation is relatively small. In tropical cyclones, the divergence of vertically integrated water vapor is highly dependent on the vertical transport and, therefore, on the wind divergence. Spaceborne scatterometers provide surface wind velocity and, therefore, surface wind divergence at spatial resolutions that are much higher than products of numerical weather prediction (NWP).

In this study, ocean surface winds derived from the observations of spacebased scatterometers and surface precipitation measured by TRMM were objectively interpolated to the same time and location during the passage of a tropical cyclone. Surface precipitation distribution was derived from wind and humidity profiles provided by NWP. When the surface level winds of NWP were replaced by the scatterometer winds, the surface precipitation patterns computed with the conservation method were found to be significantly changed and the new patterns are in much closer agreement with the patterns observed by TRMM.